IN THE CLAIMS

1. (Cancelled) A recording apparatus, comprising:

(a) a recording medium, having predetermined anisotropic optical properties, comprising at least one anisotropic vector; and

(b) a transfer mechanism, adapted for physically transferring a portion of said recording medium to a carrier in a selectively defined pattern, said transferred portion retaining a state of said predetermined anisotropic optical properties.

2. (Cancelled) The recording apparatus according to claim 1, wherein said recording medium comprises a polymer having crystalline properties, wherein a crystalline domain of said polymer recording medium has anisotropic properties.

3. (Cancelled) The recording apparatus according to claim 1, wherein at least two recording media are provided, each having distinct anisotropic properties, wherein said transferring means selects from available recording media to control an anisotropic recording pattern.

4. (Cancelled) The recording apparatus according to claim 1, wherein the recording medium is transferred in a pattern defined by a cipher.

5. (Cancelled) The recording apparatus according to claim 4, wherein a message is encoded on said carrier comprising a self-authenticating description of said pattern.

6. (Cancelled) The recording apparatus according to claim 3, wherein the pattern comprises a distribution of anisotropic properties on the carrier.

7. (Cancelled) The recording apparatus according to claim 1, wherein the recording medium comprises a fluorescent dye composition.

8. (Cancelled) A recording medium, comprising a polymer film having adhered thereto a transfer layer having a predefined anisotropic optical property, the recording medium being adapted to selectively transfer portions of the layer to a recording medium under influence of a print head while maintaining a state of the predefined anisotropic property.

9. (Cancelled) A recording method, comprising the steps of:

(a) providing a recording medium, having anisotropic optical domains; and

(b) transferring a portion of the recording medium to a carrier while maintaining a state of the anisotropic optical domains, wherein a portion of the recording medium has macroscopically detectable anisotropic optical properties.

10. (Cancelled) The method according to claim 9, further comprising the step of accounting for said transferring step in an accounting database.

11. (Cancelled) The method according to claim 9, further comprising the steps of: (a) defining a pattern of recording media on the carrier; (b) authenticating the carrier based on a correspondence of a subsequently detected pattern to the defined pattern; and (c) accounting for said authenticating step in an accounting database.

12. (Cancelled) An imprinted carrier, produced by a method comprising the steps of: (a) providing a recording medium, having anisotropic optical domains; and (b) transferring a portion of the recording medium to a carrier while retaining a state of the anisotropic optical domains, wherein a portion of the recording medium has macroscopically detectable anisotropic optical properties.

13. (Cancelled) The carrier according to Claim 12, wherein said carrier is associated with an object, wherein a message identifying the object is imprinted on the carrier.

14. (Cancelled) An authentication device, comprising:

(a) an illumination source having a narrowband output adapted for exciting fluorescence at a wavelength differing from said narrowband output;

(b) a polarizer having a selectively controlled polarization axis;

(c) an optical filter to exclude the narrowband output and pass the fluorescence at the wavelength differing from said narrowband output;

(d) an optical imaging sensor directed toward an imaging region, for sensing dichroic elements and a recorded data pattern through said optical filter; and

(e) a processor for performing a digital background subtraction under a plurality of respective axes of said polarizer, for extracting a pattern of dichroic elements sensed by the optical imaging sensor within the imaging region, and for authenticating a medium supporting said dichroic elements based on a correspondence of the extracted pattern of dichroic elements and a predetermined pattern of dichroic elements defined in the recorded data pattern.

15. (Cancelled) The device according to claim 14, wherein the illumination source comprises a broadband light source in series with a narrow band optical filter.

16. (Cancelled) The device according to claim 14, wherein the polarizer comprises a rotating linear polarizer.

17. (Cancelled) The device according to claim 14, wherein said optical filter comprises a broadband bandpass optical filter.

18. (Previously Presented) An optically readable data storage medium, comprising an optically readable substrate having a data pattern and a set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process, further comprising a recorded hash of identifications of the random optically readable characteristics and the data pattern associated with the data storage medium, the data pattern and the optically readable characteristics being adapted to be readable by a common imaging system, wherein the data storage medium is resistant to reproduction and alteration of the data pattern can be detected.

19. (Previously Presented) The storage medium according to claim 18, wherein the data storage medium comprises an identification card.

20. (Previously Presented) The storage medium according to claim 18, wherein the data pattern is molded into the data storage medium and the hash are formed as a pattern on a surface of the medium in a common plane with the molded data pattern.

21. (Previously Presented) A data storage disk, comprising a graphic-bearing surface, a code printed on the graphic bearing surface, and an ascertainable pattern formed during a physical non-deterministic manufacturing process formed on the disk, wherein the printed code provides self authentication for the disk based on the ascertainable pattern, the printed code and the ascertainable pattern being adapted to be readable by a common imaging system, wherein the data storage disk is resistant to reproduction.

22. (Withdrawn) A system for reading an optically readable data storage medium having a common imaging system for authentication and data retrieval, comprising:

an optically readable substrate having a data pattern and a set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process, further comprising a recorded hash of identifications of the random optically readable characteristics and the data pattern associated with the data storage medium; and

an encoded optical disk reader, comprising:

(a) an optical sensor having a common optical path for reading the recorded hash of identifications, the data pattern, and the set of optically readable characteristics from the disk;

(b) a non-deterministic characteristic analyzer for analyzing the set of optically readable characteristics; and

(c) an authenticator, authenticating the disk based on an output of the non-deterministic characteristic analyzer and the recorded hash of identifications, wherein the optically readable substrate is resistant to reproduction and alteration of the data pattern can be detected.

23. (Withdrawn) The system according to claim 22, wherein the optical sensor reads an optical encoding of the disk and the set of optically readable characteristics.

24. (Withdrawn) The system according to claim 22, wherein the optical sensor is distinct from an optical sensor which reads an optical encoding of the disk while sharing the common optical path.

25. (Withdrawn) The data storage disk according to claim 22, wherein the set of optically readable characteristics comprises a random reading defect of the disk.

26. (Withdrawn) The data storage disk according to claim 22, wherein the set of optically readable characteristics comprises a dye pattern on the disk.

27. (Withdrawn) The data storage disk according to claim 22, wherein the set of optically readable characteristics comprises a random distribution of fibers disposed on the disk.

28. (Withdrawn) The data storage disk according to claim 22, wherein the optical sensor reads a self-authentication code from the disk.

29. (Cancelled) Authenticating sealing tape, comprising a seal tamper indicator, a plurality of unique identification portions of the tape, periodically disposed along a length thereof, and an ascertainable non-deterministic characteristic of the tape in proximity to the periodic unique identification portions.

30. (Cancelled) The authenticating sealing tape according to claim 29, wherein the ascertainable non-deterministic characteristic is a pattern selected from the group consisting of a random dye pattern and a random fiber pattern.

31. (Cancelled) An authentication device, comprising:

(a) an illumination source having a narrowband output adapted for exciting fluorescence at a wavelength differing from said narrowband output, having a time-varying polarization axis;

(b) an optical filter to exclude the narrowband output and pass the fluorescence at the wavelength differing from said narrowband output;

(c) an optical imaging sensor directed toward an imaging region, for sensing dichroic elements and a recorded data pattern through said optical filter; and

(d) a processor for extracting a pattern of dichroic elements from a background, based on changes in an output of said optical imaging sensor under a plurality of respective polarization axes, and for determining whether the extracted pattern corresponds to a predetermined pattern.

32. (Cancelled) The authentication device according to claim 31, wherein said illumination source comprises a light emitting diode.

33. (Cancelled) The authentication device according to claim 31, wherein an intensity of said excited fluorescence varies over time.

34. (Cancelled) The authentication device according to claim 31, wherein said optical imaging sensor comprises an area array imaging sensor.

35. (Cancelled) An authentication system, comprising:

(a) an optically readable data storage medium, comprising an optically readable substrate having a data pattern and a set of anisotropic optically readable fluorescent characteristics which are randomly determined by a non-deterministic physical manufacturing process;

(b) a recorded hash of identifications of the characteristics and at least a portion of the data pattern, the recorded hash being associated with the data storage medium

(c) an illumination source adapted for exciting the fluorescent characteristics;

(d) a polarizer;

(e) an optical filter which filters an output of the illumination source and passes the fluorescence;

(f) a common optical imaging sensor directed toward an imaging region, for sensing fluorescent characteristics and a recorded data pattern through said optical filter; and

(e) a processor for extracting a pattern of the anisotropic optically readable fluorescent characteristics, and for authenticating the storage medium based on a correspondence

of the extracted pattern and the recorded hash, whereby the data storage medium is resistant to reproduction and alteration of the data pattern can be detected.

36. (Cancelled) The authentication system according to claim 35 wherein the illumination source comprises a narrowband output adapted for exciting fluorescence at a wavelength differing from said narrowband output.

37. (Cancelled) The authentication system according to claim 35, wherein a polarization axis of the polarizer is selectively controllable.

38. (Cancelled) The device according to claim 35, wherein the illumination source comprises a broadband light source in series with a narrow band optical filter.

39. (Cancelled) The device according to claim 35, wherein the polarizer comprises a rotating linear polarizer.

40. (Cancelled) The device according to claim 35, wherein said optical filter comprises a broadband bandpass optical filter.

41. (Currently Amended) The system according to claim 46 ~~22~~, wherein the optically readable substrate ~~comprising~~ comprises a self-authenticating sealing tape, the tape further comprising a seal tamper indicator, the data pattern comprises a plurality of unique identification portions of the tape, periodically disposed along a length thereof, wherein a recorded hash of identifications is disposed proximate to a respective unique identification portion.

42. (Previously Presented) The system according to claim 41, wherein the optically readable characteristics comprise a pattern selected from the group consisting of a random dye pattern and a random fiber pattern.

43. (Previously Presented) An optically readable data storage medium, comprising: an adhesive-backed flexible substrate; periodically disposed sets of optically

readable data patterns on said substrate; regions of said substrate having optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process proximate to a respective data pattern; and periodically disposed sets of recorded hashes, each respective hash being formed from a respective data pattern and characteristics of a respective region, wherein the data storage medium is resistant to reproduction and alteration of the data pattern can be detected.

44. (Previously Presented) The optically readable data storage medium according to claim 43, wherein the optically readable characteristics comprise a random dye pattern

45. (Previously Presented) The optically readable data storage medium according to claim 43, wherein the optically readable characteristics comprise a random fiber pattern.

46. (New) An optically readable data storage medium, comprising an optically readable substrate having a data pattern and a set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process, further comprising a cryptographically processed set of identifications of the random optically readable characteristics and the data pattern associated with the data storage medium, the data pattern and the optically readable characteristics being adapted to be readable by a common imaging system, wherein the data storage medium is resistant to reproduction and alteration of the data pattern can be detected.

47. (New) The optically readable data storage medium according to claim 46, wherein said cryptographically processed set of identifications comprises a cryptographic hash.

48. (New) The optically readable data storage medium according to claim 46, wherein said cryptographically processed set of identifications comprises a digital signature.

49. (New) The optically readable data storage medium according to claim 46, wherein said cryptographically processed set of identifications is encrypted using a public-key private key technique.

50. (New) The optically readable data storage medium according to claim 46, wherein said optically readable characteristics comprise a fluorescence pattern.

51. (New) The optically readable data storage medium according to claim 46, wherein said optically readable characteristics comprise a polarization pattern.

52. (New) The optically readable data storage medium according to claim 46, wherein said optically readable characteristics comprise a random fiber pattern.

53. (New) The optically readable data storage medium according to claim 46, in combination with an authentication device, said authentication device comprising:

(a) an illumination source having an output adapted for exciting fluorescence;

(d) an optical imaging sensor, for sensing a pattern of fluorescence; and

(e) a processor for analyzing said pattern of fluorescence as said set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process, to determine a correspondence thereof with said cryptographically processed set of identifications of the random optically readable characteristics and the data pattern associated with the data storage medium.

54. (New) The optically readable data storage medium according to claim 53, wherein said set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process comprise a non-deterministic optical polarization pattern.

55. (New) The optically readable data storage medium according to claim 53, wherein said set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process comprise a non-deterministic optical fluorescent

polarization pattern, wherein said illumination source excites a fluorescence of said pattern, and said optical imaging sensor determines a polarized fluorescent optical pattern.

56. (New) The optically readable data storage medium according to claim 53, wherein said set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process comprise a non-deterministic optical polarization pattern, wherein said optical imaging sensor determines a polarization pattern under at least two different image acquisition states.

57. (New) The optically readable data storage medium according to claim 53, wherein said set of optically readable characteristics which are randomly determined by a non-deterministic physical manufacturing process comprise a non-deterministic optical fluorescent pattern, wherein said illumination source and optical imaging sensor together determine a specific fluorescence characteristic of the fluorescent optical pattern.

58. (New) The optically readable data storage medium according to claim 46, further comprising an authentication device, said authentication device comprising:

(a) an illumination source having a narrowband output adapted for exciting fluorescence at a wavelength differing from said narrowband output, having a time-varying polarization axis;

(b) an optical filter to exclude the narrowband output and pass the fluorescence at the wavelength differing from said narrowband output;

(c) an optical imaging sensor directed toward an imaging region, for sensing dichroic elements and a recorded data pattern through said optical filter; and

(d) a processor for extracting a pattern of dichroic elements from a background, based on changes in an output of said optical imaging sensor under a plurality of respective polarization axes, and for determining whether the extracted pattern corresponds to a predetermined pattern.

59. (New) The optically readable data storage medium according to claim 46,

wherein said optically readable data storage medium comprises an optically readable substrate having a data pattern and a set of anisotropic optically readable fluorescent characteristics which are randomly determined by a non-deterministic physical manufacturing process;

further comprising an authentication device, said authentication device comprising:

(a) an illumination source adapted for exciting the fluorescent characteristics;

(b) a polarizer;

(c) an optical filter which filters an output of the illumination source and passes the fluorescence;

(d) a common optical imaging sensor directed toward an imaging region, for sensing fluorescent characteristics and a recorded data pattern through said optical filter; and

(e) a processor for extracting a pattern of the anisotropic optically readable fluorescent characteristics, and for authenticating the storage medium based on a correspondence of the extracted pattern and the recorded hash, whereby the data storage medium is resistant to reproduction and alteration of the data pattern can be detected.